

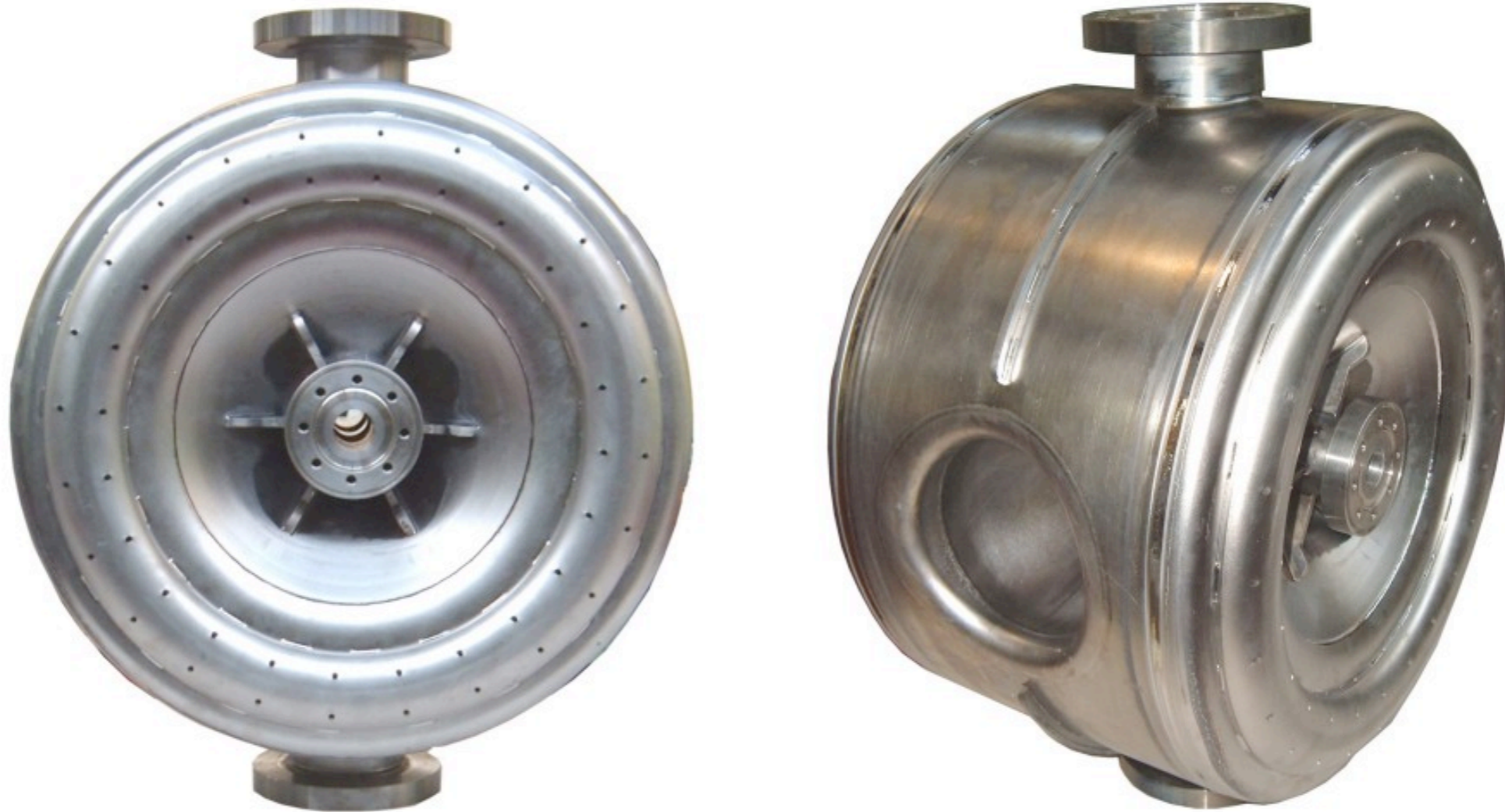


The first SSR1-ez is completed!

26 april 2007

G. Lanfranco - TD - SRF Development

The first SSR1-ez



PROTON DRIVER - SSR Single Spoke Resonator

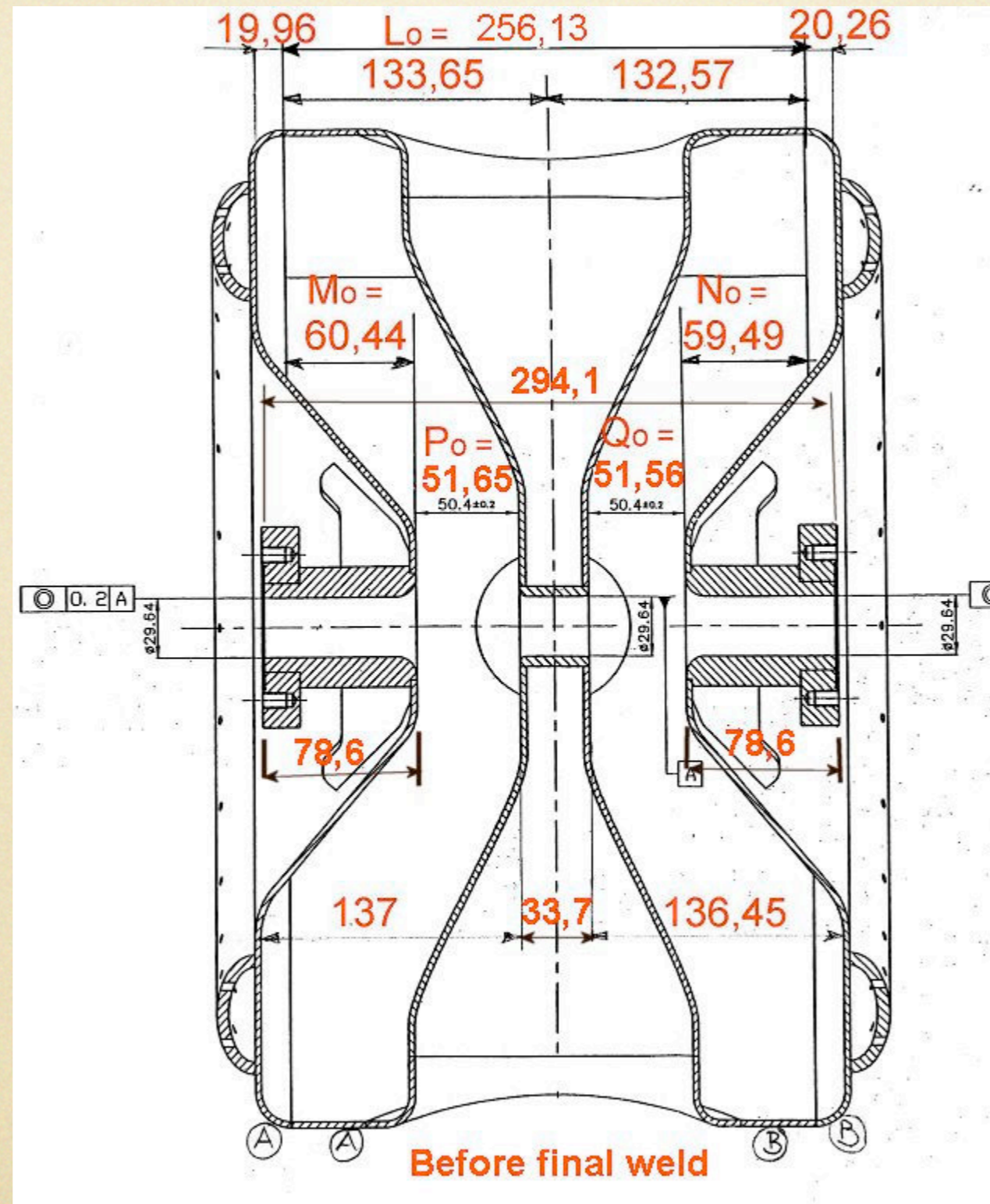


Outline

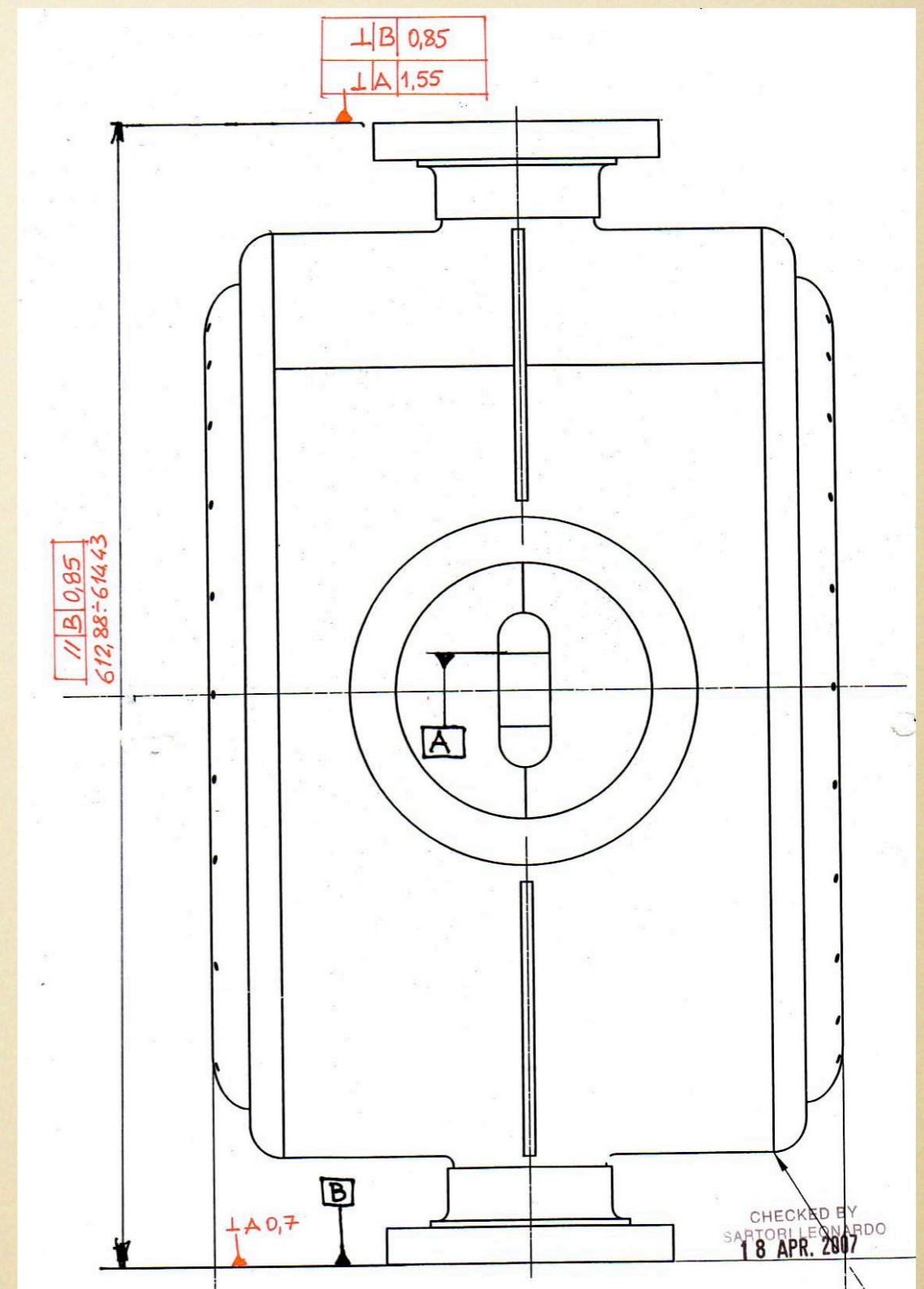
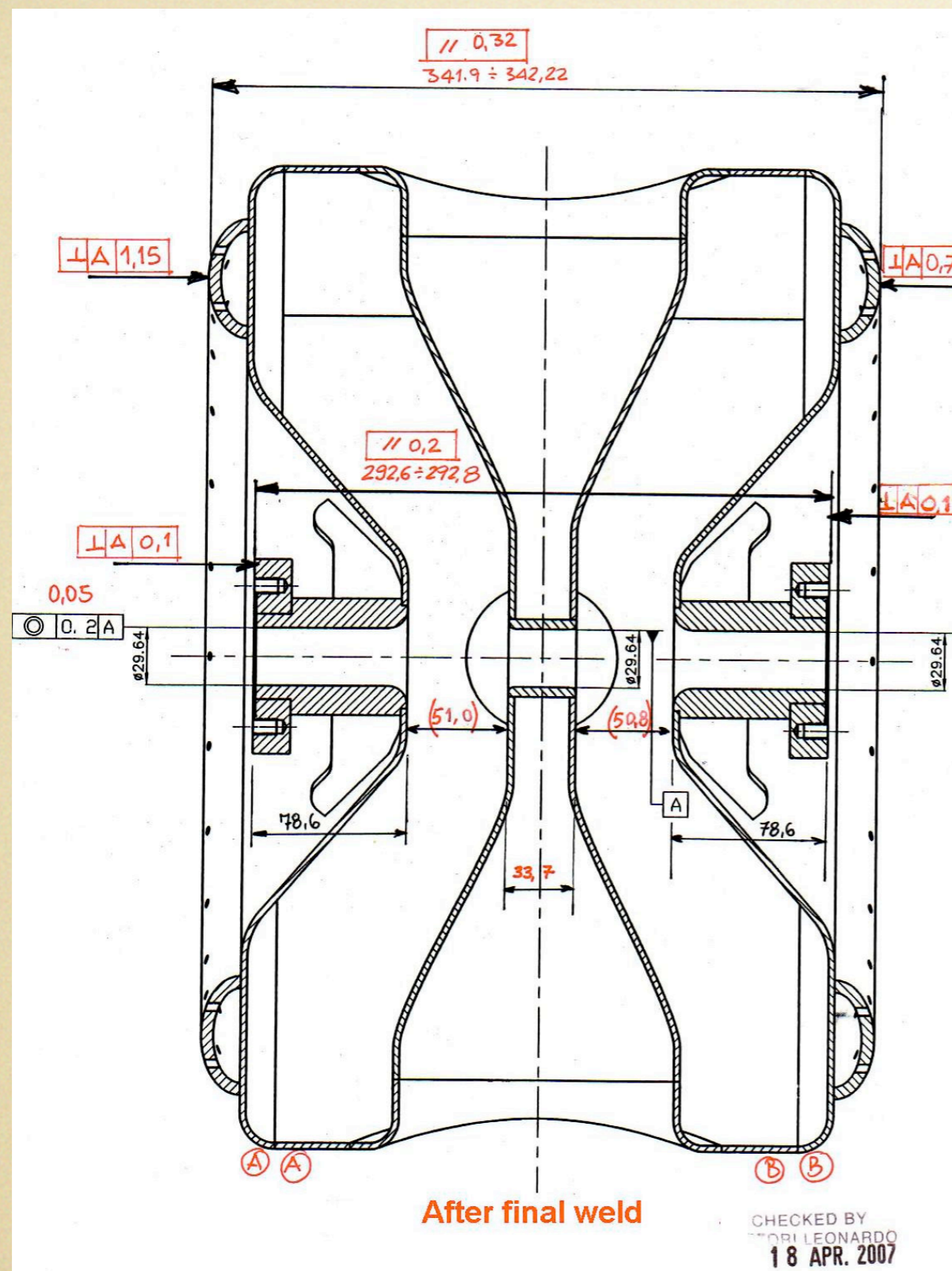
- The cavity has been successfully leak checked !
- The warm resonant frequency is **324.73** MHz @ 21°C !
- $Q_o = 6205$!



Dimensional Check - Before Weld



Dimensional Check - After weld



Dimensional and Frequency measurements - updated

Target F = **324.535** MHz

Measure N°	L _o [mm]	F [MHz]	ΔL [mm]	ΔL [mm] expected	ΔF [kHz]	ΔF /mm/ side [kHz] (**)	Q _o
initial	266,22	328,606	-	-	-	-	3670
#1	264,4	327,961	1,82	2	645	708.8	4362
#2	260,60	326,625	3,8	4	1336	703.2	4490
#3	258,80	326,0275	1,80	2	597.5	663.9	5412
before weld	256,13	325,0475	2,67	0,8+1,7 (*)	980	734.1	4025
After weld (***)		325.132					5855
inelastic def. (***)		324.728					6205

(*) a correction was necessary to bring the two iris gaps to be comparable

(**) theoretical $\Delta F = 735$ kHz / mm / side

(***) @ 24 °C



?

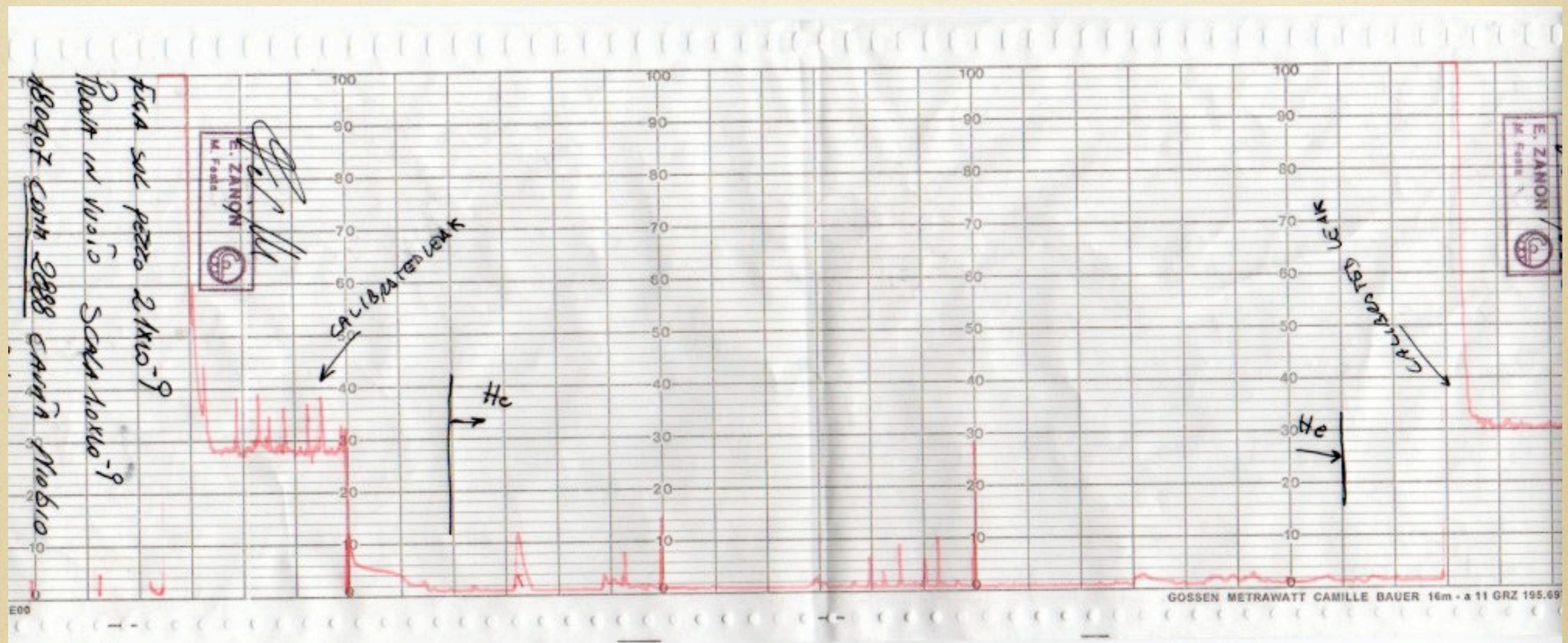
- It is not clear why the frequency did not go down despite the 1.4 mm weld shrinkage (expected 324.53 MHz^{***})
- G.Corniani suggests it may induced by a balancing effect due to Magnetic volume reduction. The magnetic ΔV is much smaller than the electric but $\epsilon_0 E_0^2$ and $\mu_0 B_0^2$ may have different weight (we need Ivan's FEA)
- Maybe measurement before weld was wrong?

*** $325.04 \text{ MHz} - 1.4 \text{ mm} \times 734 \text{ KHz} / 2 \text{ mm} = 324.53 \text{ MHz}$



Leak check

- No leak greater than $6.7 \times 10^{-11} \text{ mbar l s}^{-1}$



What is left before shipping

- Measurements shown have been done before inelastic tuning and leak check. Zanon will redo the measurement by end of this week.
- It is not clear what is the spring back behavior of the end wall during inelastic tuning and what is the amount of force applied to achieve the $\sim 400\text{KHz}$ frequency shift.
- The welded RF surface finish is very good. They will anyway send us a boroscope picture of the area that to their judgement is the worst.



Considerations

- Even if the final warm frequency is close to target F (thanks to ease of inelastic tuning), frequency shifts need to be better understood and predicted
- Hence it is advisable to weld the end wall in two operations with a tuning check in between

